

1 WHAT IS CLAIMED IS:

2

3 1. A process for making a stabilized polyalkenyl sulfonic acid comprising:

4

5 (a) reacting a polyalkene with SO₃ in a first reaction vessel; and

6

7 (b) stabilizing the product of step (a) by neutralizing with a neutralizing

8 agent as the product of step (a) exits the first reaction vessel and

9 prior to or concurrently with entering a second vessel for further

10 reaction or storage, wherein neutralization occurs in the absence of

11 ammonia or sodium hydroxide.

12

13 2. The process according to Claim 1 wherein the neutralizing agent is an

14 alkaline earth metal hydroxide.

15

16 3. The process according to Claim 1 wherein the product of step (b)

17 contains less than 20% sultones.

18

19 4. The process according to Claim 1 wherein the polyalkenyl group is a

20 polyisobutenyl group.

21

22 5. The process according to Claim 4 wherein the polyisobutenyl group is

23 derived from polyisobutene containing greater than 20 mole percent of

24 alkylvinylidene and 1,1-dialkyl isomers.

25

26 6. The process according to Claim 5 wherein the polyisobutenyl group is

27 derived from polyisobutene containing greater than 50 mole percent of

28 alkylvinylidene and 1,1-dialkyl isomers.

29

30 7. The process according to Claim 6 wherein the polyisobutenyl group is

31 derived from polyisobutene containing greater than 70 mole percent of

32 alkylvinylidene and 1,1-dialkyl isomers.

1 8. The process according to Claim 2 wherein the alkaline earth metal
2 hydroxide is calcium hydroxide.

3

4 9. The process according to Claim 1 wherein the polyalkene has a number
5 average molecular weight of about 300 to about 1000.

6

7 10. The process according to Claim 9 wherein the polyalkene has a number
8 average molecular weight of about 300 to about 750.

9

10 11. The process according to Claim 10 wherein the polyalkene has a
11 number average molecular weight of about 350 to about 600.

12

13 12. The process according to Claim 1 wherein the amount of fragmentation
14 in the product of step (b) is less than about 15%.

15

16 13. The process according to Claim 1 further comprising mixing a carboxylic
17 acid with the polyalkene prior to reacting with SO₃.

18

19 14. The process according to Claim 13 wherein the polyalkene is
20 polyisobutene.

21

22 15. The process according to Claim 14 wherein the polyisobutene has a
23 number average molecular weight of at least about 300 to about 1000.

24

25 16. The process according to claim 13 wherein the carboxylic acid is acetic
26 acid.

27

28 17. The process according to Claim 1 further comprising diluting the
29 polyalkene prior to reaction with SO₃.

30

31 18. The process according to Claim 16 wherein the diluted polyalkene is
32 mixed with carboxylic acid prior to reaction with SO₃.

1 19. The process according to Claim 1 further comprising the step of
2 overbasing the neutralized product of step (b) with an alkaline earth
3 metal basic salt.

4

5 20. The process according to Claim 19 wherein water is used as a promoter.

6

7 21. The process according to Claim 20 wherein the amount of water used is
8 from about 0.5 to about 8.0 wt% of the total stabilized polyalkenyl
9 sulfonic acid.

10

11 22. The process according to Claim 19 wherein the overbasing temperature
12 is from 100°C to about 170°C.

13

14 23. The process according to Claim 19 wherein the overbasing pressure is
15 from about 25 to about 65 psia.

16

17 24. A process for overbasing polyalkenyl sulfonic acids comprising
18 overbasing the polyalkenyl sulfonic acid with an alkaline earth metal
19 basic salt and wherein water is used as a promoter.

20

21 25. The process according to Claim 24 wherein the amount of water used is
22 from about 0.5 to about 8.0 wt% of polyalkenyl sulfonic acid.

23

24 26. The process according to Claim 25 wherein the overbasing temperature
25 is from 100°C to about 170°C.

26

27 27. The process according to Claim 25 wherein the overbasing pressure is
28 from about 25 to about 65 psia.